
GUIDELINES FOR COMPOST SANITATION¹

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Compost may be defined as a mixture of decomposed organic matter of different origins including plant debris, soil residues as well as other substances found in municipal solid waste and animal waste. This finished product is useful in amending soils and as a potting media component of nursery mixes (4).

Composting plant debris, soil and solid wastes has become an important commercial enterprise in the past few years as an economical means of alleviating the "garbage crisis" (6). More than 70 percent of our trash is now buried in 5,500 active landfills across the country; however, it is becoming increasingly difficult to find environmentally safe sites for additional landfills (6). A recent study has shown that paper and organic waste (discarded yard material, wood, and food residues) represent 63% of the total solid waste volume disposed in a landfill (6). A large portion of this organic waste can be reused for agricultural purposes if the organic waste is properly treated and transformed into compost.

The principle of composting by harnessing the appetites of biodegradable microorganisms is well known. In commercial operations the raw organic material is mechanically shredded or ground after removal of thick plastic and metallic components present in the organic material. The ground mass is then placed in piles to be decomposed by aerobic biodegradation. The mass may be sprayed with water or a water suspension of biodegrading bacteria or with enzymes to enhance the aerobic biodegradation process. During the decomposition process, which lasts several weeks to several months, the piles are treated and turned inside out in order to favor aerobic bacteria activity and to expose all parts of the organic pile to high decomposition temperatures. The finished biodegraded product is screened mechanically to remove large pieces of organic material and stored in bags or large piles. The process of aerobic biodegradation produces heat in the decomposing organic matter. Temperatures ranging from 50 C (122 F) to 74 C (165 F) and from 40 C (104 F) to 70 C (158 F) were measured at various depths in the composting piles at two sites in Florida. Except for 104 F, these temperatures are lethal to phytoparasitic nematodes and other unwanted organisms. Phytoparasitic nematodes, including cysts, are killed at warm temperatures of 46 C (115 F) - 55 C (130 F) for 10-120 minutes of direct exposure. Thus, the finished compost is, theoretically, free of these pests. Unfortunately, in several commercial composting operations the mature compost is subject to contamination by raw material added accidentally to the finished product or by other sources such as water runoff or vehicular or foot traffic from the dump site of the undecomposed material to the final product.

It has been shown that compost-amended potting mixes are naturally suppressive to several soilborne disease organisms of ornamental crops (4). There is a growing market for these composted materials in Florida nurseries, and several commercial compost operators have requested assistance from the Florida Department of Agriculture and Consumer Services, Division of Plant Industry, to provide guidelines so that the finished compost product can be certified free of phytoparasitic nematodes. The purpose of this circular is to establish sanitation guidelines for commercial production that will assure that composted materials are suitable for nematode certification. It has been demonstrated that lack of sanitation can cause contamination by nematode pests which can be a threat to nursery certification. Many nursery sanitation principles are also applicable to compost operations. Some of these have been discussed in bureau of nematology circulars which were previously published (1,2,3,5). They are available upon request from the bureau at the address shown on this circular.

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Guidelines for Handling Raw Material

Composting may be done outdoors or indoors under cover. Both conditions are presented here for dumping of raw material.

Outdoor Dump Site: The incoming raw material dump site should be established a minimum of 100 feet from any finished or composting product. Because nematodes can be readily transported by free flowing water, a drainage ditch at least 2 feet deep or a solid wall at least 2 feet high should encompass any portion of the dump site adjacent to the composting area. The entire site should be treated with a contact herbicide with no residual activity and at specific intervals as needed to keep the area free of weeds. The dump site should not be established on land sloping towards the mature compost area.

Indoor Dump Site: The site should be at least 100 feet from the composting area or finished product. The floor should be solid and constructed in such a manner that water or other liquid runoff cannot reach the compost holding area.

At either site, delivery vehicles shall be restricted to designated off loading and turn around areas only.

Equipment and Traffic Flow: Passive movement of nematodes occurs by soil or other debris clinging to tires or adhering to vehicle parts during any type of vehicular movement (3). This is especially true of equipment used in the first stage of moving raw materials to the shredder-grinder and secondly by the movement of shredded and ground raw materials to the composting pile. Only that equipment used to move raw materials to the shredder-grinder should be allowed in the area and only designated driveways and turn around areas should be utilized. Vehicular movement to any other area should only be done after the equipment is power washed to remove debris from tires and chassis.

Shredder-Grinder (Hammermill): The shredder-grinder should be as close to the raw materials source as possible and a minimum of 100 feet from the nearest compost pile. The shredded or ground product should be placed in an area in the vicinity of this equipment or loaded and transported directly to the composting area.

Movement of Shredded-Ground Raw Compost: It should be remembered that this material contains live nematodes and other organisms that can readily contaminate clean compost. Therefore, all precautions must be taken during transport of this material from the shredder-grinder to the receiving site to begin the compost process. This is the second critical stage of raw materials movement. The equipment moving the ground compost should operate at least 40 feet away from composted material.

Guidelines for Composting Areas

Composting Area: This area should be at least 40 feet from any source of contamination. The composting material should be placed in well separated piles extending longitudinally (windrows) to avoid any contamination between windrows. The composting area should be sloped to favor complete drainage of water from the windrows. Standing water causes undesirable fermentation processes in the piles and can result in splashing of contaminated water around the organic piles during the aerating and turning operations.

The land around the compost area should be kept free of weeds and sloped to provide water drainage away from the windrows. Irrigation water should come from wells or from ponds free of weeds around the banks.

Equipment: Machinery used for turning and aerating the windrows should start from the oldest (composted) material and work towards the newest (freshest) material in order to prevent contamination of composted product with the fresh and infected organic matter. The temperatures of 50 C (122 F) and 74 C (165 F), which we have registered at the two composting sites during the biodegradation process, are sufficient to kill any phytoparasitic nematodes. Only through recontamination can these nematodes be reintroduced in the piles. Therefore, the equipment should be kept free of debris from other sources or cleaned after each operation.

Handling Mature Compost Material

Movement of Composted Material: Vehicles designated to move finished composted materials should be used only for this purpose and never be allowed to move into a contaminated area.

Mature Compost Area: The mature compost should be stored on a raised bed or solid surface away from contaminating sources such as weeds, other infested plant material, and water runoff to prevent its contamination in the storage area.

If the compost is to be further screened, the screening equipment should be used on finished compost only. The finished screened product is to be stored adopting the same precautions mentioned above.

Movement of Mature Composted Product to Market: The undercarriage of trucks or trailers used for the transport of finished compost must be washed to remove debris before entering the storage area. They should be restricted to designated roadways.

Employee Education

Signs should be posted alerting employees of the precautions that must be taken at every step in the composting process to prevent contamination that will jeopardize the final product. Employees should understand that sound sanitation practices are necessary to avoid contamination and consequent loss of nematode certification.

CITATIONS:

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4. Hoitink, H. A. J., Y. Inbar, and M. J. Boehm. 1991. Status of compost-amended potting mixes naturally suppressive to soilborne diseases of floricultural crops. *Plant Disease* 75:869-873.
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